



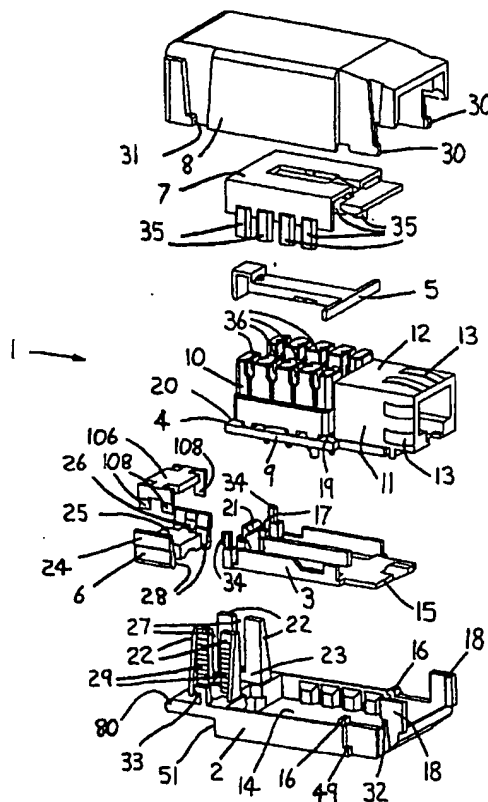
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: SHIELDED JACK SOCKET ASSEMBLY

## (57) Abstract

This invention relates to a shielded jack socket assembly, that is to say a jack socket assembly in which a substantially continuous metal shield surrounds a jack socket and its associated terminal connectors to provide electrical, electromagnetic, and electrostatic shielding for the jack socket itself and the conductors connected thereto. The invention provides a shielded jack socket assembly (1) comprising a first metal housing part (2); a PCB assembly (4) secured to the first metal housing (2), the PCB assembly (4) comprising a printed circuit board (9) on which is mounted a jack socket (11) and a terminal block (10) for providing connections to the conductors of the jack socket (11) via the printed circuit board (9); at least one post (22) secured to the first housing (2); a retainer (6) mountable on the post (22) to secure an incoming cable to the first housing (2) with the screening and/or drain wire of the incoming cable in contact with the metal of the first housing (2); and a second metal housing part (2) securable to the first metal housing (2) to form therewith an enclosure which surrounds the PCB assembly (4). The jack socket assembly of the present invention has the advantage over the prior art of allowing rapid and accurate connection to an incoming cable without the need for special tools. Furthermore, the present invention can be readily opened to permit changes of wiring and permits the release and removal of a connected incoming cable to allow the jack socket assembly to be re-used with a different cable or terminal arrangement.



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### SHIELDED JACK SOCKET ASSEMBLY

This invention relates to a shielded jack socket assembly, that is to say a jack socket assembly in which a substantially continuous metal shield surrounds a jack socket and its associated terminal connectors to provide electrical, electromagnetic, and electrostatic shielding for the jack socket itself and the conductors connected thereto.

Shielded jack socket assemblies are well known in the telecommunications and data processing arts and are used where electrical or electromagnetic or electrostatic shielding is required. To provide effective shielding the shielded jack socket assembly must incorporate a housing of metal which is electrically connected to the screen of an incoming cable and any drain wire associated with that cable, and which surrounds the jack socket proper or is electrically connected to a metal can which surrounds the jack socket proper. Shielded jack sockets of the prior art have been difficult and time consuming to wire and/or cannot be re-wired.

The present invention provides a shielded jack socket assembly which is formed from a multiplicity of separate components each of which can be readily manufactured. The jack socket assembly may be supplied to a user in a partially pre-assembled state facilitating rapid and accurate connection to an incoming cable whereupon the user may add the remaining components to

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complete the jack socket assembly quickly and without the need for special tools. The jack socket assembly of the present invention can readily be opened to permit changes of wiring and permits release and removal of the original cable to enable the jack socket assembly to be re-used with a different cable or different terminal arrangement.

The jack socket assembly may be installed in a wall plate or alternatively it may be installed in a patch panel 'nest' in a manner to be described in more detail below.

According to one aspect of the present invention the shielded jack socket assembly comprises a first metal housing part; a PCB assembly secured to the first metal housing, the PCB assembly comprising a printed circuit board on which is mounted a jack socket and a terminal block for providing connections to the conductors of the jack socket via the printed circuit board; at least one post secured to the first housing; a retainer mountable on the post to secure an incoming cable to the first housing with the screening and/or drain wire of the incoming cable in contact with the metal of the first housing; and a second metal housing part securable to the first metal housing to form therewith an enclosure which surrounds the PCB assembly.

In the preferred embodiment of the invention the first metal housing and PCB assembly are supplied to a user pre-assembled. The user then provides the necessary connections of an incoming cable to the terminal block and secures the cable to the first housing part using the retainer in a manner such that the screen of the incoming cable and/or a drain wire of the incoming cable are in contact with the metal of the first housing part. The user may then secure the second housing part to the first housing part in order to complete the wiring operation.

Preferably, the first housing part and the second housing part are provided with moulded plastics inserts which, in the assembled jack socket assembly, substantially surround the terminal block and printed circuit board to

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prevent accidental electrical connection between the terminal block or the printed circuit board or the incoming cable and the metal housing parts.

Preferably, the jack socket itself is provided with a metal shielding can, and preferably such shielding can makes electrical connection directly with the first and second housing parts. Preferably, the printed circuit board includes at least one earth conductor and means are provided for automatically connecting the earth conductor of the printed circuit board to the first housing part when the PCB assembly is secured to the first housing part.

Preferably, the PCB assembly is secured to the first housing part by means of the insulating insert provided for the first housing part.

Preferably, the second housing part includes latches which can be interengaged with corresponding latches on the first housing part by moving the first and second housing parts relative to each other in the longitudinal direction of the jack socket. The latches, when engaged, prevent relative movement of the housing parts away from each other perpendicular to the longitudinal direction of the jack socket. Preferably, spring loaded clips are provided to retain the first and second housing parts in the position in which their respective latches are interengaged. Preferably, such clips are provided by portions of the insulating inserts associated with the first or second housing parts. In a particularly preferred embodiment of the invention the clips are provided by resilient portions of the insulating insert of the first housing part which snap behind corresponding protrusions provided on the second housing part as the latches are interengaged to retain the housing parts in their use configuration.

In a particularly preferred embodiment of the invention the or each post is provided by a stud which is integral with the first housing part. Preferably, at least two spaced apart studs are provided to define therebetween a cable retention area in which the incoming cable is secured. Preferably, the retainer engages all of the studs to retain the cable in position. Preferably, the retainer is a ratchet device which cooperates with ratchet teeth provided on the or

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each stud so that the retainer may be positioned in its operative position by a simple push action. Preferably, the ratchet arrangement is releasable to permit removal of the retainer.

The invention also provides a patch panel assembly including several jack socket assemblies as described above. The jack socket assemblies are preferably arranged in a row on a tray which may form part of a drawer slidable into and out of a rack which may receive other similar drawers. Preferably means are provided for securing each jack socket assembly in its respective tray against lateral or transverse movement in the plane of the tray. To this end, each jack socket assembly is preferably held in the tray by means of an insert, preferably of moulded plastic, which releasably retains the jack socket assembly and is fixed to the tray. One insert may hold a group of jack socket assemblies and one tray may hold several groups.

The above and further features and advantages of the invention will become clear from the following description of a preferred embodiment thereof, given by way of example only, reference being had to the accompanying drawings wherein:

Figure 1 is an exploded schematic perspective view of one embodiment of the present invention;

Figure 2 is an exploded schematic perspective view of a wall mounting box for use with the shielded jack socket assembly of Figure 1;

Figure 3 is an exploded perspective view of a patch panel assembly including several jack socket assemblies according to the invention;

Figure 4 is a perspective view of the patch panel of Figure 3 when assembled;

Figures 5 and 6 are perspective views of a moulded nest for receiving four shielded jack socket assemblies;

Figure 7 is a side view of the drawer handle of Figures 4 and 5; and

Figures 8a and 8b are perspective views of the drawer handle of

Figure 7.

Referring firstly to Figure 1 the illustrated shielded jack socket assembly 1 comprises eight components, viz: a lower housing part 2; a lower housing part insulating insert 3; a PCB assembly 4; a terminal block insert 5; a cable retainer 6; a cable retainer locking wedge 106; an upper housing part insulating insert 7; and an upper housing part 8. The lower and upper housing parts 2,8 are diecastings of any suitable metal, for example a zinc alloy. The insulating inserts 3,7, the terminal block insert 5, the cable retainer 6 and the cable retainer locking wedge 106 are plastics mouldings. The PCB assembly 4 comprises a printed circuit 9 to which is secured a terminal block 10 and a jack socket 11. The printed circuit board 9 provides electrical connections between cable terminals of the terminal block 10 and the conductors of the jack socket 11. The terminal block 10 is preferably of the "Krone" type well known in the telecommunications industry. The jack socket 11 preferably includes a metal can 12 having integral spring fingers 13 for contacting the housing parts 2,8 as described in more detail hereinafter.

The lower housing part insulating insert 3 is moulded to be snugly received within a dish like portion 14 of the lower housing part 2. Preferably, the forward end 15 of the insert engages under latches 16 formed integrally with the lower housing part 2 and the rear end 17 of the insert is provided with a latch (not shown) which automatically engages with an appropriate latch member provided on the lower housing part as the insert 3 is pressed into the dish like portion 14. The arrangement is preferably such that insert 3 can be readily snap-fitted into the dish like portion 14 but can be removed by releasing the relevant latch.

The PCB assembly 4 is secured to the lower housing part 2 by means of the insert 3. To this end, the PCB assembly is offered up to the lower housing part so that the lower front edge of the jack socket 11 is received between upstanding posts 18 of the lower housing part. The arrangement is such that the spring fingers 13 resiliently bear against the posts 18 to provide direct electrical

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connection between the can 12 and the lower housing part 2. The PCB assembly is then manipulated such that shoulders 19 provided on the printed circuit board 9 engage under the latches 16 and the rear edge 20 of the printed circuit board 9 is pushed downwardly to snap-fit under a corresponding latch 21 provided on the insulating insert 3. Thus, the lower housing part 2, the lower housing part insert 3 and the PCB assembly 4 may be pre-assembled for supply to a customer. The latch arrangements provided by the insert 3 ensure that the components remain firmly connected together against accidental displacement, but allow disassembly of the components if required by appropriate manipulation of the latches.

Four studs 22 are formed integrally with the lower housing part 2 at the rear end thereof. The studs 22 define therebetween a cable retention area 23 for receiving an incoming cable. The cable retention area 23 is positioned to present the conductors of the incoming cable to the terminal block 10 for connection thereto.

In use, a user supplied with the pre-assembled lower housing part 2, insert 3 and PCB assembly 4 will strip back the end of an incoming cable to reveal the separate conductors and to expose the cable screen (if present). If a drain wire is present this will be pulled back and wrapped around the screen or cable sheath in the cable retention area 23 in order to provide direct electrical connection between the drain wire and/or the cable screen and the lower housing part 2. The retainer 6 is then offered up to the studs 22 and pushed downwardly to retain the cable in position. To this end, retainer 6 comprises a pair of ratchet members 24 which are secured to the central body 25 of the retainer by bridges 26. The bridges 26 are sized to be received in the gap 27 between each pair of studs 22 so that ratchet teeth 28 on the ratchet members 24 can engage corresponding ratchet teeth 29 provided on the exterior surfaces of the studs 22. With this arrangement, once the incoming cable has been laid in the cable retention area 23, the cable retainer 6 is simply pressed into position to lock the cable in the required position with the drain wire and/or cable screen in electrical contact with the lower housing part 2.



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The cable retainer locking wedge 106 comprises wedge portions 108 which are then pressed between the central body 25 and the ratchet members 24 so as to prevent disengagement of the interengaging ratchet teeth 28,29. The individual conductors of the incoming cable may then be connected to the terminal block 10 in a conventional manner. It will be appreciated that the above described arrangement provides a particularly simple cable termination operation for a user which can readily be accomplished in minimum time and provides reliable and automatic connection of the incoming cable screen or drain wire to the metal of the lower housing part 2 and provides a degree of strain relief. If it is desired to remove the cable, the locking wedge 106 may be removed and the ratchet members 24 manipulated to release the interengaging ratchet teeth 28,29 whereupon the retainer 6 can be removed and a new cable inserted as required.

The terminal block insert 5 is also preferably part of the pre-assembly referred to above and is used to provide identification for the terminals that connect to block 10 and to prevent inadvertent contact between incoming conductors and exposed metal parts lying beneath the terminal block 10.

Once connection of the incoming cable has been completed as described above the upper housing part 8 is secured to the lower housing part. The upper housing part is pre-assembled with the upper housing part insulating inset 7. Since the insert 7 is not required to form any latch function (in the manner of the insert 3) retention of the insert 7 within the upper housing part 8 may be by way of an interference fit, by use of adhesives, or by use of appropriate latch surfaces.

The upper housing part 8 is secured to the lower housing part 2 by engaging latches 30 and 31 provided on the upper housing part with corresponding latches 32,33 provided on the lower housing part. This interengagement is effected by offering the upper housing part 8 to a lower housing part 2 with the upper housing part offset somewhat to the rear of its use position relative to the lower housing part, and then sliding the upper housing part in the forward direction to interengage the latches 30,31,32,33. In doing so, the fingers 13 of the jack socket

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can 12 contact the interior of the upper housing part 8 at the front thereof to provide direct electrical connection between the can 12 and the upper housing part 8. As the upper housing part is pushed forwardly into its final position clips 34 provided on the lower housing part insulating insert 3 snap over protrusions provided on the interior of the upper housing part 8 thereby retaining the upper housing part in its final position. If, in use, the upper housing part is to be removed it is simply pushed rearwardly relative to the lower housing part to snap the clips 34 over the corresponding protrusions of the upper housing part, and then lifted away from the lower housing part. It will be noted, therefore, that the housing parts 2,8 can be assembled and disassembled quickly and easily without the use of tools or separate retaining devices such as screws.

It will be noted that the insulating insert 7 associated with the upper housing part 8 includes depending fingers 35 of insulating material. In the final position of the components these fingers 35 lie between the outer ends of the cable receiving grooves 36 of the terminal block 10 and the overlying metal of the upper housing part 8. This arrangement ensures that any conductors protruding from the grooves 36 (because they have not been cut short) cannot contact the metal of the upper housing part 8.

The above described shielded jack socket assembly is of general utility wherever a high efficiency high quality shielded jack socket is required, and provides rapid and reliable cable termination and simple assembly. However, the shielded jack socket assembly is of particular utility in patch panel systems and for wall outlets, and the preferred embodiment of the present invention provides particular mounting arrangements specifically adapted to utilise the above described shielded jack socket assembly in such arrangements.

Referring firstly to Figure 2, a wall outlet adapter 40 for securing the shielded jack socket assembly 1 to a wall outlet plate of a building is provided. The wall outlet adapter 40 comprises a body 41, a jack socket mounting clip 42, a cover member 43, a shutter 44 and a spring 45. Components 41 - 44 can be

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moulded from suitable plastics material. Spring 45 is preferably a metal spring.

Body 41 is provided with integral clips 46 so that the body can be secured to an appropriate fascia plate, eg. of a type which may be secured to a metal box embedded in the wall of the building. The clip 42 is secured to the body 41 by means of appropriate latches 47. The body 41 is formed with internal guide rails (not shown) which enable a pre-wired jack socket assembly to be slid into the body 41 from the rear to present the open end of the jack socket to an aperture 48 provided in the front of the body 41. The body includes suitable shoulders for cooperating with shoulders 49 (Figure 1) provided on the lower housing part 2 for positively locating the front of the jack socket assembly. A spring loaded latch 50 is provided by the clip 42 for engaging the rear edge 51 (Figure 1) of the lower housing portion 2 to retain the jack socket assembly in position within the wall outlet adapter. The latch 50 may be released to facilitate removal of the jack socket assembly if required.

The guide rails within the body 41 are orientated such that the axis of the jack socket extends downwardly in the forward direction of the body. Preferably, the axis of the jack socket assembly is located at about  $40^\circ$  to the vertical. This arrangement ensures that a jack plug which is plugged into the jack socket is orientated at an angle which provides for a relatively strain-free exit of the jack plug cable.

When the jack plug is not present within the socket, the socket is closed by the shutter 44. In order to keep the overall projection of the wall outlet adapter 40 from the wall to a minimum the shutter arrangement is designed such that when a jack plug is present within the jack socket the shutter 44 is stored behind a vertically extending portion 52 of the cover member 43. Thus, in moving from the position in which it closes the aperture 48 to its storage position behind the vertical portion 52 and vice versa the shutter 44 follows a non-linear path. This is effected by providing the shutter 44 with a pair of integral lower pins 53 which run in a guide track parallel to the aperture 48, and a pair of upper pins 54

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which run in a vertical guide track located behind the vertical portion 52. The width of the main body portion of the shutter 44 is such that it can lie somewhat within the body 41 as it passes from its use to its storage configuration. The spring 45 seats within a groove 55 provided that the upper edge of the shutter to ensure that it is not accidentally displaced from its operative position as the shutter executes the change between each use and storage orientations.

The shutter 44 and spring 45 are retained in position by the cover member 43 which has spring clips 56 which engage in corresponding apertures provided in the body 41 to retain the cover member in position. The vertical portion 52 of the cover member and the upper sloping portion 57 thereof provide alternative sites for terminal identification information, thereby rendering the wall outlet adapter suitable for high or low level use within a building installation.

The shielded jack socket assembly described above, as stated is designed to fit into a patch panel assembly as shown in Figs. 3 and 4 as an alternative to the plastic wall plate assembly of Fig. 2.

The assembly 1 snaps into a 'four way' plastic nest 62 which snaps in turn onto a metal tray 58 by eight hooks, namely four hooks 92 located at the front of the tray and four hooks 93 at the rear. The hooks pass through corresponding holes in the metal tray 58. The nest 62 is shown in more detail in Fig. 5.

The shielded jack socket assembly 1 is located in the nest 62 by four pairs of hooks 74 at the front of the nest 62 locating onto the ledges in the housing part 2 at 49 in Fig. 1 and by four pairs of ledges 80 shown in Fig. 1 at the rear being received in a slotted plate 75 at the rear of nest 62 (see Fig.6). The slotted plate 75 is deformable to allow the removal of an assembly 1. The shielded jack protrudes through a front plate 61 by way of holes 70.

The position of the ledges on the housing part 2 prevents both lateral movement and transverse movement of the housing part 2 in the nest.

In the base of the nest 62 are four holes which allow metal spring

hooks 59 to engage with each die casting or housing part 2 to provide a common earth grounding point for each shielded jack socket assembly 1 without the use of separate grounding wires.

Strain relief on the exiting/entering cables is provided by either a cable tie or suitable plastic clip at 71.

Each tray 58 holds four nests 62 providing a 16 position assembly in 44 rows of vertical rack space. Multiple assemblies are possible by stacking the trays into different rows.

Panels 73 are attached to the tray at each side. Two mounting brackets 65 are permanently fixed to the rack enclosure at level positions on the left and right hand sides by bolts (not shown) passing through holes 101. A plastic cover (not shown) for the bolts is provided.

Two releasable clips 72 are attached to the front plate 61 by hooks 76 (see Fig. 7) passing through and locating behind the front plate in holes A.

Interlocking plastic extrusion components 90 and 91 (see Figs. 5 and 6) form the slider 63 and 64. Each extrusion is attached to its respective metal components; i.e. tray 58 or bracket 65, by bolts which pass through holes at suitable locations along its length and tighten into captive nuts in the metal components. This slider arrangement allows the tray 58 to move forwards out of the rack to facilitate work by releasing two finger clips 69 and pulling on the moulded integral handles 72. The clips 69 engage with holes 99 at the sides of the rack. The clips 69 are shown in more detail in Figs. 8a and 8b.

Stops are provided at suitable points to prevent the tray from being totally removed from the mounting brackets. A stud 100 is provided on the tray to ensure the shielded jack socket assemblies are fully grounded to a clean earth.

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## CLAIMS:

1. A shielded jack socket assembly comprising a first metal housing part; a PCB assembly secured to the first metal housing, the PCB assembly comprising a printed circuit board on which is mounted a jack socket and a terminal block for providing connections to the conductors of the jack socket via the printed circuit board; at least one post secured to the first housing; a retainer mountable on at least one post to secure an incoming cable to the first housing with the screening and/or drain wire of the incoming cable in contact with the metal of the first housing; and a second metal housing part securable to the first metal housing to form therewith an enclosure which surrounds the PCB assembly.
2. A shielded jack socket assembly as claimed in claim 1, wherein the first housing part and the second housing part are provided with insulating inserts which, in the assembled jack socket assembly, substantially surround the terminal block and printed circuit board to prevent accidental electrical connection between the terminal block or the printed circuit board or the incoming cable and the metal housing parts.
3. A shielded jack socket assembly as claimed in claim 1 or 2, wherein the jack socket itself is provided with a metal shielding can.
4. A shielded jack socket assembly as claimed in claim 3, wherein the shielding can electrically connects directly with the first and second housing parts.
5. A shielded jack socket assembly as claimed in any of the preceding claims, wherein the printed circuit board includes at least one earth conductor and means are provided for automatically connecting the earth conductor of the printed circuit board to the first housing part when the PCB assembly is secured to the first

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housing part.

6. A shielded jack socket assembly as claimed in any of the preceding claims appended to claim 2, wherein the PCB assembly is secured to the first housing part by means of the insulating insert provided for the first housing part.

7. A shielded jack socket assembly as claimed in any of the preceding claims, wherein the second housing part includes latches which can be interengaged with corresponding latches on the first housing part by moving the first and second housing parts relative to each other in the longitudinal direction of the jack socket.

8. A shielded jack socket assembly as claimed in claim 7, wherein spring loaded clips are provided to retain the first and second housing parts in the position in which their respective latches are interengaged.

9. A shielded jack socket assembly as claimed in claim 8 appended to claim 2, wherein the clips are provided by portions of the insulating inserts associated with the first or second housing parts.

10. A shielded jack socket assembly as claimed in claim 9, wherein the clips are provided by resilient portions of the insulating insert of the first housing part which snap behind corresponding protrusions provided on the second housing part as the latches are interengaged to retain the housing parts in a use configuration.

11. A shielded jack socket assembly as claimed in any of the preceding claims, wherein the or each post which is integral with the first housing part.

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12. A shielded jack socket assembly as claimed in claim 11, wherein at least two spaced apart posts are provided to define therebetween a cable retention area in which the incoming cable is secured.
13. A shielded jack socket assembly as claimed in claim 11 or 12, wherein the retainer engages all of the posts to retain the cable in position.
14. A shielded jack socket assembly as claimed in any of claims 11 to 13, wherein the retainer is a ratchet device which cooperates with ratchet teeth provided on the or each post so that the retainer may be positioned in its operative position by a simple push action.
15. A shielded jack socket assembly as claimed in claim 14, wherein the ratchet arrangement is releasable to permit removal of the retainer.
16. A patch panel assembly including two or more of the jack socket assemblies claimed in any of claims 1 to 15.
17. A patch panel assembly as claimed in claim 16, wherein the jack socket assemblies are arranged in at least one row.
18. A patch panel assembly as claimed in claim 17, wherein the jack socket assemblies are arranged on a tray.
19. A patch panel assembly as claimed in claim 18, wherein the tray defines part of a draw slidable into and out of a rack.
20. A patch panel assembly as claimed in claim 19, wherein means are provided for securing each jack socket assembly in the tray against lateral or



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transverse movement in the plane of the tray.

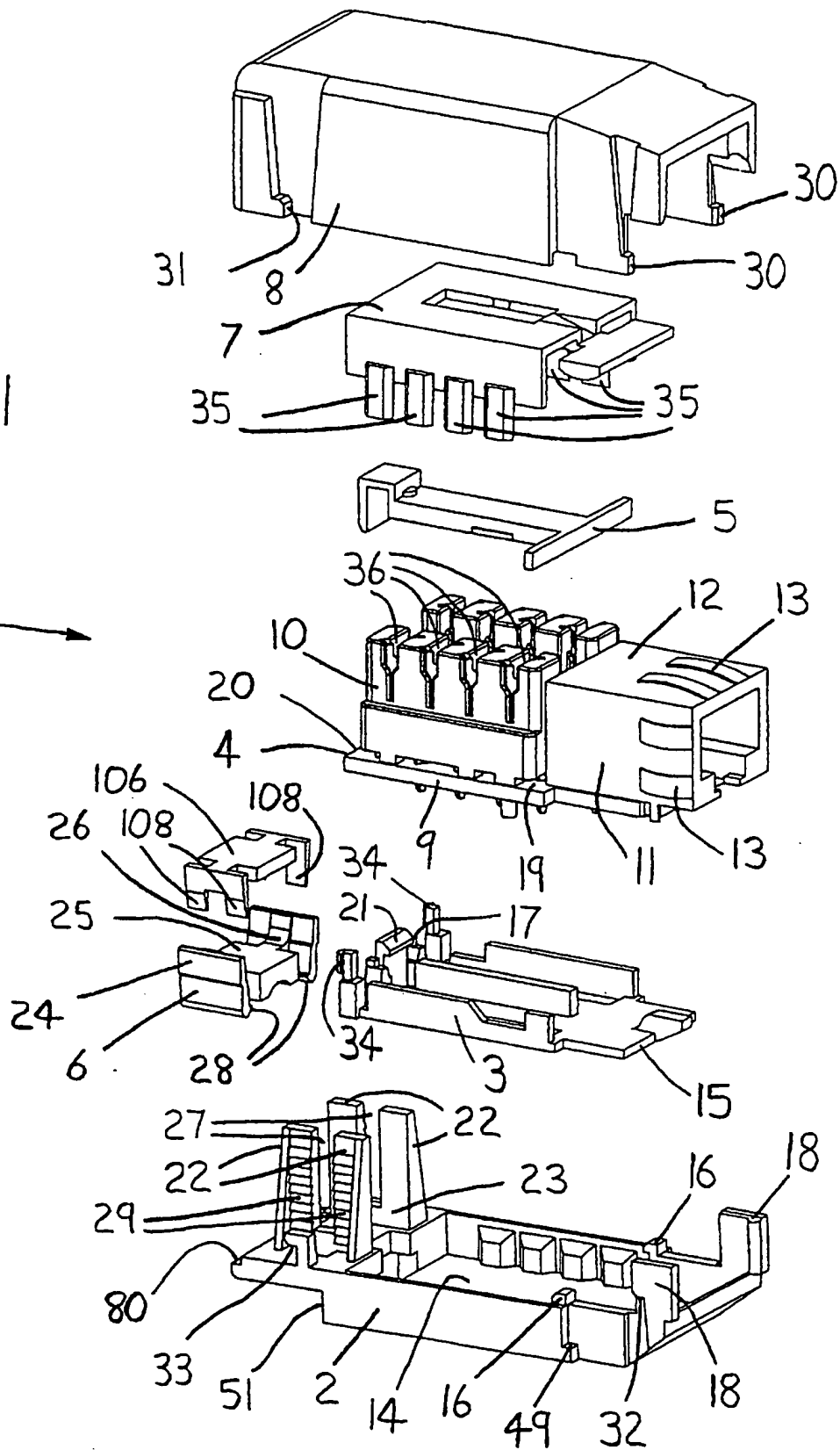
21. A patch panel assembly as claimed in claim 20, wherein each jack socket assembly is held in the tray by means of an insert which releasably retains the jack socket assembly and is fixed to the tray.

22. A patch panel assembly as claimed in claim 21, wherein the insert is moulded from a plastics material.

23. A patch panel assembly as claimed in claim 21 or 22, wherein one insert holds a group of jack socket assemblies.

24. A patch panel assembly as claimed in claim 23, wherein one tray holds two or more groups of jack socket assemblies.

FIG. 1



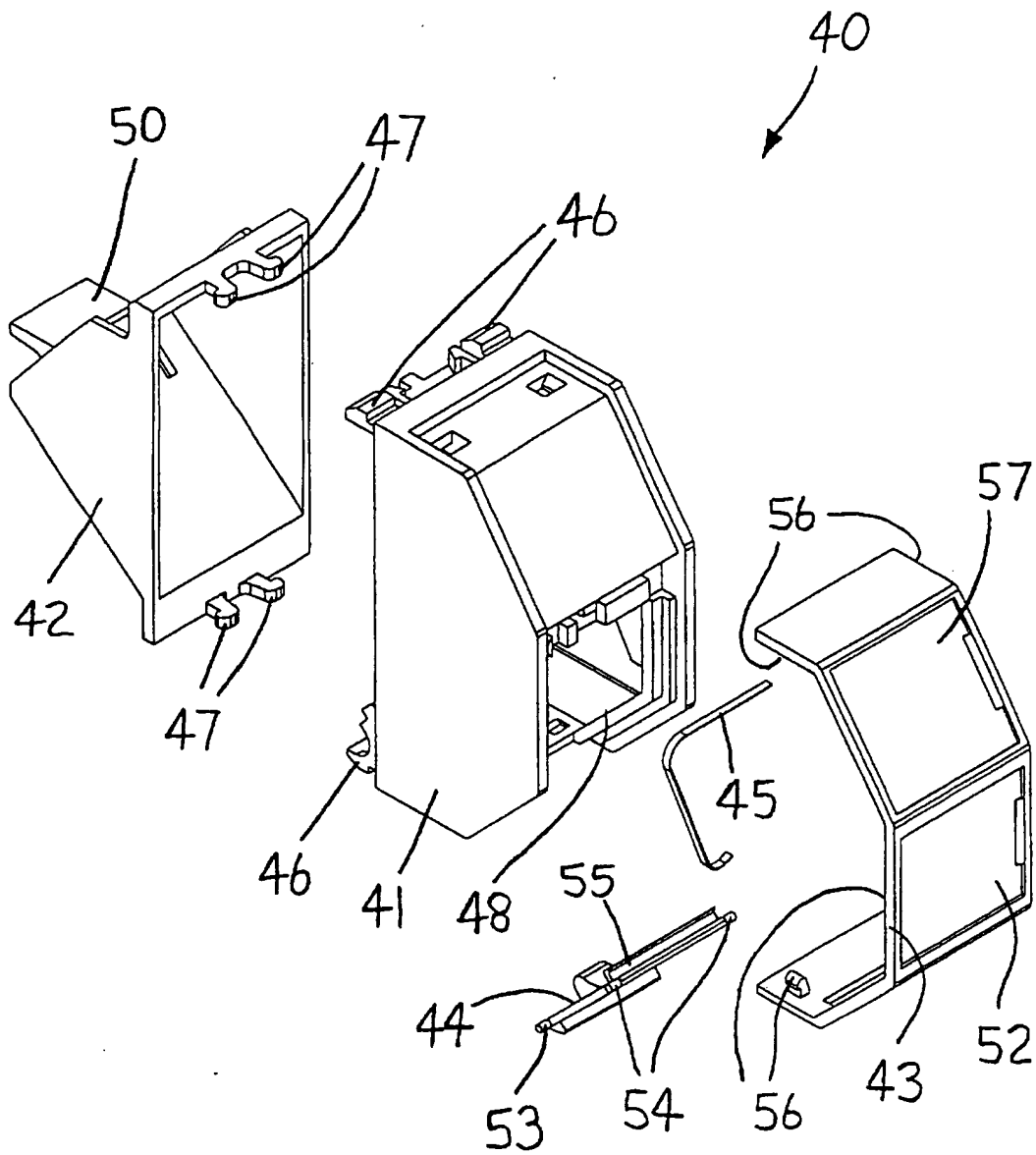


FIG. 2



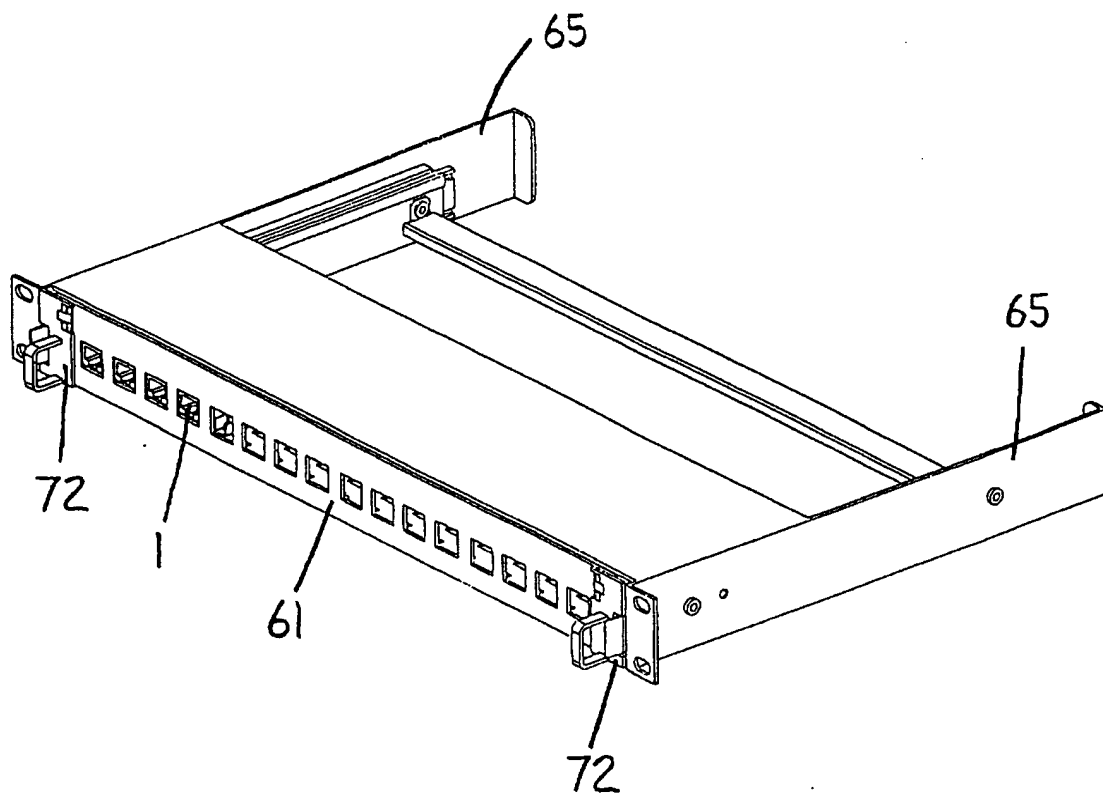


FIG. 4

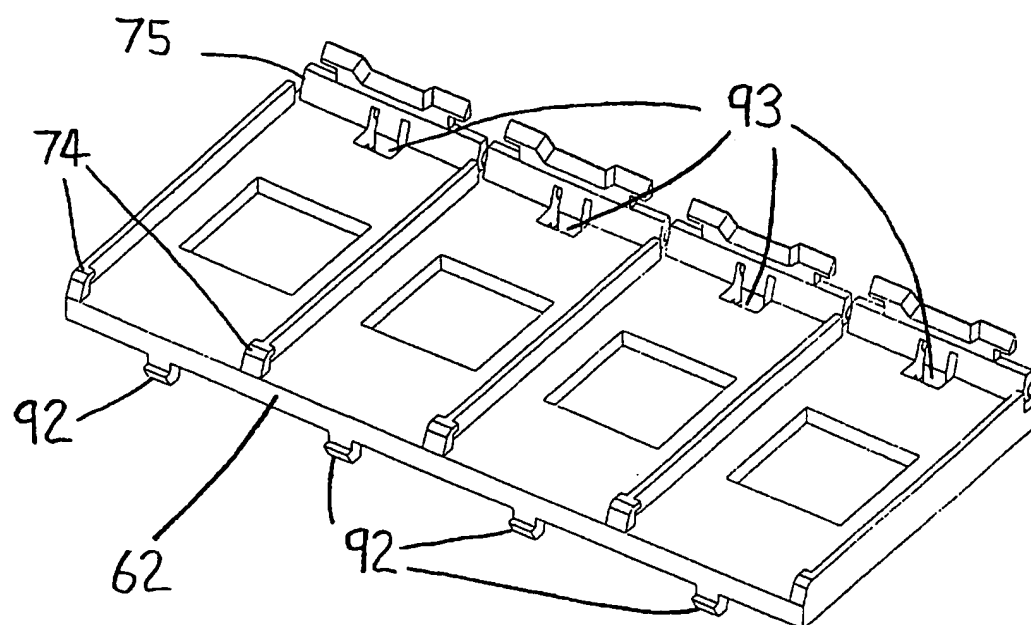
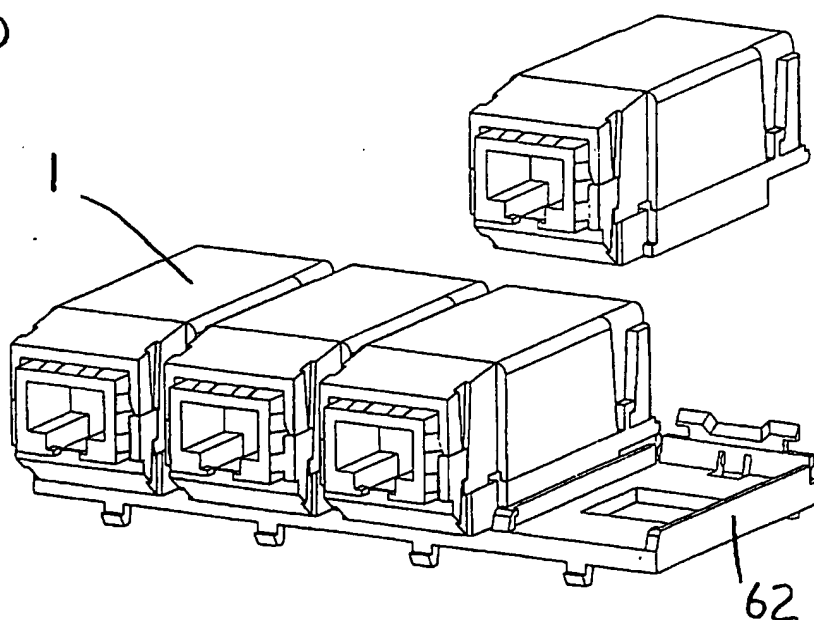


FIG. 5

FIG. 6



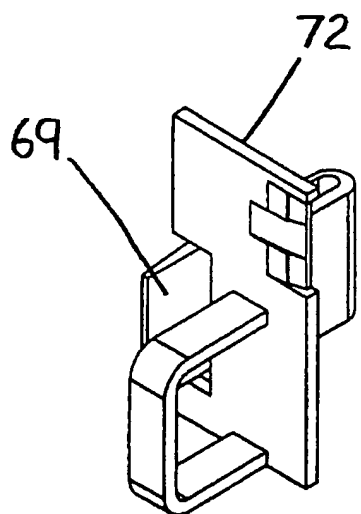


FIG. 8a

FIG. 8b

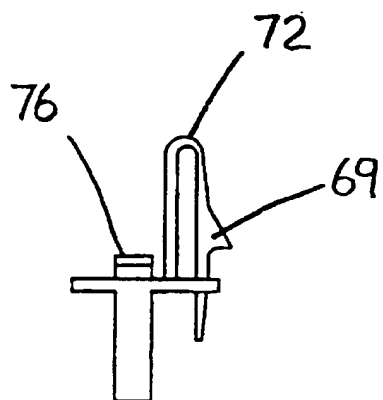
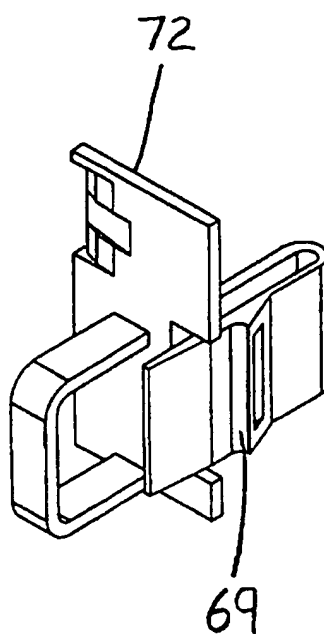


FIG. 7

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 97/01316

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 H01R13/658

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 94 18724 A (MARS ACTEL ; LECOMTE DIDIER (FR); LALOUM LAURENT (FR)) 18 August 1994	1
Y	see page 12, line 23 - page 15, line 16; figures 3,4	2-4
A		10-15
Y	US 5 052 949 A (LOPATA JOHN E ET AL) 1 October 1991	2-4
A	see column 2, line 65 - column 5, line 58; figure 1	6,8
A	DE 93 01 553 U (SIEMENS AG) 1 April 1993 see the whole document	1,2
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☐ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

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Information on patent family members

International Application No

PCT/GB 97/01316

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